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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,994	11/21/2001	Tetsuya Hori	500.40886X00	9525

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EXAMINER

GENCO, BRIAN C

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 01/16/2003

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restart period for
response. *[Signature]*

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/988,994

Applicant(s)

HORI ET AL.

Examiner

Brian C Genco

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2002 and 19 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 01 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

1. The Applicant's amendment filed November 1, 2002 has overcome the 35 USC 102(a) rejection of Claim 7.

2. The proposed drawing changes filed November 1, 2002 are approved by the Examiner.

3. The Applicant's arguments filed November 1, 2002 have been fully considered by the Examiner but they are not deemed persuasive.

Applicant argues that Howell does not disclose the claimed "image processing unit generates and outputs a single monochromatic image using only pixel data detected by photo detectors corresponding to the two filters for the selected color of three colors," namely that "Fig. 6 does not show images including a green image as apparently alleged by the Examiner, but that Fig. 6 merely shows arrays of red, blue, and green data that are combined by software to generated a composite color image."

In response, Examiner points out that in the passage in column 2, lines 30-41 Howell broadly teaches that in order to capture a composite color image "that is reasonably true in color" one can take three separate pictures using one of the primary colors for each and then output these individual images to be assembled into a composite color image. Using that broad teaching Howell then goes on to disclose in the passage in column 8, line 66 through column 9, line 27 and Fig. 6 that in a two-shot operation after obtaining the output of the two images, one of the images being shifted by one pixel, there is generated "arrays of red, blue, and green data" as argued by Applicant. These arrays of data include one array of "measurement data for green for every single point (column 9, line 10, Howell)," wherein as broadly taught by Howell each of

Art Unit: 2615

these arrays is an image that can be used to generate a composite color image as shown in Fig. 6. With this teaching in mind one of ordinary skill in the art readily sees that the green image is the claimed “single monochromatic image using only pixel data detected by photo detectors corresponding to the two filters for the selected color of three colors,” wherein after generating this monochromatic image from the two-shot operation Howell discloses outputting it to be combined with the other color images that were generated in order to create a composite color image.

Applicant argues that since Howell does not disclose the claimed “image processing unit generates and outputs a single monochromatic image using only pixel data detected by photo detectors corresponding to the two filters for the selected color of three colors” in claim 1, then Howell also does not disclose the claimed method of “generating a monochromatic image by synthesizing a plurality of pixel data extracted before and after the shifting step.”

In response, it is readily apparent to one of ordinary skill in the art that based on the discussion above Howell does disclose the claimed method of “generating a monochromatic image by synthesizing a plurality of pixel data extracted before and after the shifting step,” wherein the method of “synthesizing a plurality of pixel data extracted before and after the shifting step” is disclosed by Howell as shown in Fig. 6 by extracting and recombining the green pixel data of the two-shot operation in order to “obtain actual measurement data for green for every single point (column 9, lines 9-10, Howell).”

Art Unit: 2615

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6 and 8-14 are rejected under 35 U.S.C. 102(a) as being anticipated by (USPN 6,046,772 to Howell et al).

In regards to claim 1 Howell et al, herein Howell, discloses all of the necessary information in order to reject all parts of the claimed “image processing apparatus” as noted in the following five paragraphs.

In regards to the claimed “imaging optical system for forming an image of an object on an imaging surface” as claimed in claim 1 Howell discloses a digital camera that has “at the focal plane an array of electronic light-sensitive elements ... that produce a light-intensity-dependant electrical signal in response to being illuminated (column 1, lines 29-33, Howell).”

In regards to the claimed “color imaging device” as claimed in claim 1 Howell discloses an “array of electronic light-sensitive elements (column 1, line 30, Howell).” Howell further discloses “the color matrix in the present invention is based on a unit cell of primary colors that is a mosaic in which half the pixels are one primary color and the rest are divided equally between the two complementary primary colors (column 7, lines 14-18, Howell).” Note figure 3 depicting a “plurality of sets of four filters for three colors, two filters of the four filters being for a selected color of the three colors.” Howell still further discloses “the unaided light-sensing

Art Unit: 2615

elements do not distinguish between different colors of light ... In order to capture the color data needed ... one can use several primary color filters (column 2, lines 28-32, Howell),” or in other words the “object being formed on the photo detectors through the filters by the imaging optical system.”

In regards to the claimed “shift drive means for shifting the imaging optical system and the photo detectors relative to each other by a distance corresponding to a predetermined number of pixels on the imaging surface” as claimed in claim 1 Howell discloses “there are means provided in many digital cameras currently in use by which the light-sensitive array can be shifted by a single pixel ... the present invention utilizes a precision rotation of the digital camera about an axis passing through the principal point of its lens (column 9, lines 28-35, Howell),” whereby the “predetermined number of pixels” is “a single pixel (column 9, line 30, Howell).”

In regards to the claimed “image processing unit for generating an image using a plurality of image data picked up before and after the shifting” as claimed in claim 1 Howell discloses “two photographs will serve to record the image in one primary color for every pixel position (column 7, lines 25-26, Howell).” Howell further discloses “between the two photographs the light sensing array is shifted with respect to the image by one pixel (column 7, lines 27-29, Howell).” Howell still further discloses “electronic circuitry/software used to combine the two images produced in the two-shot mode uses the luminous intensity of a particular primary color at all locations in the image to produce an integrated/interpolated image (column 7, lines 31-35, Howell).”

Art Unit: 2615

In regards to the claimed “image processing unit generates and outputs a single monochromatic image using only pixel data detected by photo detectors corresponding to the two filters for the selected color of the three colors” as claimed in claim 1 Howell discloses “as one records,” or “outputs,” “a series of photographs; each image,” or “single ... image,” captured will depict the scene as it appears in one primary color (column 2, line 35, Howell),” or “monochromatic,” wherein one of the “series of photographs (column 2, line 33, Howell)” is of the color green as disclosed in figure 6. Howell further discloses from figure 6 that “the result of having taken the two single shots will be to obtain actual measurement data for green for every single point (column 9, lines 8-10, Howell),” or a “single monochromatic image” in green wherein the green color filter in figure 6 is the same as the claimed “two filters for the selected color of the three colors.”

In regards to claim 2 Howell discloses in figure 6 that his color filter is “arranged according to the Bayer scheme.”

In regards to claim 3 Howell discloses the “light-sensing array is shifted with respect to the image by one pixel (column 7, lines 28-29),” wherein $n = 1$ is the integer of the claimed “length corresponding to $1/n$ ” by which “the shift drive means shifts the imaging optical system and the photo detectors relative to each other.”

In regards to claim 4 Howell discloses in figure 6 “the selected color of the three colors is green,” also note figure 5(a)-(d).

In regards to claim 5 Howell discloses “as shown in the composite array at the bottom of FIG. 6, for the single color--- red or blue---,” or “pixels lacking pixel data of the selected color,” “that needs to be interpolated at a given pixel ... For example ... actual measurements for the

Art Unit: 2615

luminous intensity of green and blue, and requires an interpolation to be done to determine the contribution that red will make to the composite image (column 9, lines 11-19, Howell).”

In regards to claim 6 as being a method for using the device claimed in claim 1 see examiners notes on the rejection of claim 1.

In regards to claim 8 refer to examiners notes on the amendment above. Note that in the single shot mode in column 8, lines 42-65 and Fig. 4 Howell discloses that there is no generation of a monochromatic image as shown in Fig. 6 and as discussed above. Therefore Howell’s invention does disclose “selectively outputting one of the single monochromatic image and the color image,” namely the selection between the single shot or two-shot modes of operation, wherein in the single shot mode, no monochromatic images are outputted, however in the two-shot mode a monochromatic image is outputted as discussed above.

In regards to claim 9 see examiners notes on the rejection of claims 2 and 6.

In regards to claim 10 see examiners notes on the rejection of claims 4 and 6.

In regards to claim 11 see examiners notes on the rejection of claims 5 and 6.

In regards to claim 12 see examiners notes on the rejection of claims 1 and 6.

In regards to claim 13 see examiners notes on the rejection of claims 1, 2, 6 and 9.

In regards to claim 14 see examiners notes on the rejection of claims 1, 6 and 12.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2615

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over (USPN 6,046,772 to Howell) in view of (USPN 5,960,128 to Hamada).

In regards to claim 7 Howell discloses a “shifting step” as described in the rejection of claim 1 wherein the broad teaching of the Howell reference as a whole teaches the process of taking a picture, shifting the pixels and the color filter relative to each other, taking another picture, and combining the image data to generate monochromatic images of a scene that will then be outputted and combined to create a composite color image “that is reasonably true in color.” As noted by Applicant, in accordance with the amendment of claim 7 Howell does not disclose the amended claim language of “the shifting step, the picking-up step after the shifting step, and the extracting step after the shifting step are repeated a plurality of times for a plurality of different shift positions.”

Hamada discloses, “In such the image input apparatus, a single image of high resolution is obtained by performing pixel shifting operation in the following manner. First, light path of an

Art Unit: 2615

incoming optical image or the image sensing device 102 is shifted by a predetermined amount (e.g., half pixel) by the shift controller 127 so as to interpolate image data between pixels, as shown in FIGS. 5A to 5P, and an image is taken at each shifted position to obtain a plurality of images (16 images in the case of FIGS. 5A to 5P). Thereafter, the obtained plurality of images are combined to generate a single image of high resolution (column 3, lines 31-42, Hamada),” wherein it would have been obvious to one of ordinary skill in the art at the time of the invention to have used Hamada’s pixel shifting operation in Howells invention in order to obtain a high resolution image and thereby improve image quality.

6. Applicant's amendment to claim 7 necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any response to this final action should be mailed to:

Art Unit: 2615

Box AF

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

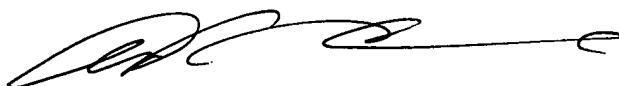
(703) 872-9314 (for Technology Center 2600 only.)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,
Arlington, VA Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Brian C. Genco who can be reached at 703-305-7881. The
examiner can normally be reached on Monday thru Friday 8:00am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Andrew Christensen can be reached on 703-308-9644. The fax phone numbers for
the organization where this application or proceeding is assigned are 703-872-9314 for regular
communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the technology center 2600 customer service office whose telephone
number is 703-306-0377.



ANDREW CHRISTENSEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600